REMARKS

Claims 1-8 remain pending in this application. Claims 5-8 stand withdrawn as being directed to a non-elected invention.

Claim 1 has been amended to more particularly point out the invention by specifying that the maximum pore size determined by the bubble point method falls in the range of 0.08 to 0.138 microns, and that the ratio of the maximum pore size to the average pore size falls in the range of 1.00 to 1.38. Support for a maximum pore size of 0.138 microns can be found in Examples 11 and 13 of Table 2 (page 46 of the specification), and support for a ratio of maximum pore size to the average pore size to 1.38 can be found in Examples 4 and 11 of Table 2. Accordingly, no new mater has been introduced by these amendments. It should also be noted that the amendments to claim 1 mean that Examples 10 and 14 do not fall within the scope of the claimed invention as amended.

Claims 1-4 have been rejected under 35 U.S.C. § 103 as being unpatentable over Kondo et al. (JP 2002/0088188 - machine translation provided by USPTO). Kondo et al. is said to disclose a polyolefin microporous membrane meeting all limitations of these claims except for the recited values of piercing strength, maximum pore size and ratio of maximum pore size to the average pore size. As to these recited characteristics, the Examiner points out that the ranges disclosed in Kondo et al. overlap with those previously recited in claim 1, such that would be obvious to a person skilled in the art to operate within the ranges disclosed in the prior art that would also be within the scope of the previously claimed invention.

Claim 1, as amended, now defines a polyolefin microporous membrane that falls outside the scope of the disclosure of Kondo et al. at least because the recited ratio of the maximum pore size to the average pore size of 1.00 to 1.38 excludes the teachings of Kondo et al. to the effect that its film has an aperture distribution index of 1.40-2.2. Accordingly, since there is no reason or motivation to obtain a ratio outside of the range taught by Kondo et al., the claimed membrane would not have been obvious from the teachings of Kondo et al. Accordingly, this rejection should be withdrawn.

Claims 1-4 have also been rejected under 35 U.S.C. § 103(a) as being unpatentable over Call (U.S. published application 2005/0031943 A1) in view of Matsuda et al. (EP 1 063 256 A1). According to the Examiner, Call teaches a polyolefin microprous membrane used as a battery separator that meets the recited features of the claimed membrane except for the maximum pore size determined by the bubble point method and the ratio of maximum pore size to the average pore size. Call does teach a pore size of about 0.04 x 0.09 microns (page 2, col. 1, line 31), but does not describe a maximum pore size, does not describe how the pore size is measured, and does not describe a ratio of maximum pore size to the average pore size.

Recognizing the absence of these teachings in Call, the Examiner relies on Matsuda et al. as describing a microporous membrane wherein the ratio of the maximum pore size to the average pore size is described as 2.0 or less, preferably 1.5 or less (paragraph 32). The Examiner argues that since there is a substantial amount of overlap between the described range in Matsuda et al. and the claimed range of 1.00 to 1.38, it would be obvious to use the claimed range in the membrane of Call. Applicants disagree with this conclusion.

Call is directed to a polyolefin microporous membrane useful as a separator for batteries, particularly in lithium secondary batteries (0001). Matsuda et al., on the other hand, while recognizing that microporous membranes can be used for a variety of purposes (0002), teaches a microporous membrane made from a vinylidene fluoride homopolymer or copolymer that forms a two-phase gel useful for its separation properties in separating fine particles from a fluid (0012, 0032). Since a filtration function is not required for the battery separator of Call, a person skilled in the battery separator art would not have a reason to consider the teachings of Matsuda et al. regarding a ratio maximum pore size to average pore size taught to be useful for removal of impurities from a liquid or gas.

As described at page 2, line 9 to page 4, line 7 of the specification, to obtain a long-life battery, it is required to make the pores of the battery separator relatively large so that they are less likely to be clogged with impurities resulting from repeating operations of charging and discharging. Aspects of battery safety such as shutdown performance and withstand voltage are improved when using a microporous membrane having a narrow pore size distribution. These aspects or characteristics of the microporous membrane used as a battery separator are not important when the membrane is used for filtration purposes.

The present invention achieves a good withstand voltage due to a combination of a specific maximum pore size (0.08 to 0.138 μm) with a specific ratio of the maximum pore size to the average pore size (the maximum pore size/the average pore size) (1.00 to 1.38). This is clear from a comparison (evaluation of "withstand voltage") of

respective Examples at Table 2 of the present specification to Examples 10 and 14 that fall outside the claimed ranges.

The claimed invention recites not only the maximum pore size but also the ratio of the maximum pore size to the average pore size which has led to greater control over the improvement shown in withstand voltage. Thus, the improvement in withstand voltage (i.e., a measure of the separator's insulating performance in terms of the voltage that allows the separator to exist as an insulator between electrodes without causing a short circuit between the electrodes) is a result of observing the combination of the recited specific maximum pore size (0.08 to 0.138 microns) with a specific ratio of the maximum pore size to the average pore size (1.00 to 1.38). There is no disclosure in Matsuda et al. regarding a concern for a battery safety aspect such as withstand voltage, and there is no disclosure in Call, either alone or in combination with Matsuda et al., that would provide a reason or motivation to maintain both the maximum pore size and ratio of maximum pore size to average pore size within the recited ranges. Accordingly, this rejection should be withdrawn.

Prompt and favorable reconsideration of this application is respectfully requested.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account 06-0916.

Respectfully submitted,

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